REMARKS

This paper is in response to the Office Action dated May 20, 2004 regarding U.S. Patent Application Serial No. 09/927,041, filed August 9, 2001. There are currently 20 claims pending. Claims 10, 17 and 20 stand objected to under 37 C.F.R. 1.75(c) as being of improper dependent form. Claims 10, 17 and 20 have been amended to place the claims in proper independent form. Claims 21 and 22 have been added. Support for Claims 21 and 22 are in the originally filed claims and in the Specification on pages 7-10. Claims 1-2, and 4-7 stand rejected under 35 U.S.C. 102 (a) as being anticipated by Qian et al., U.S. Pat. No. 6,721,454 (hereinafter Qian 454). Claims 3 and 8 stand rejected under 35 U.S. C. 103(a) as being unpatentable over Qian 454. Claims 9, 11-15 and 16-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Qian 454 in further view of Qian et al, U.S. Pat. No. 6,616,529 (hereinafter Qian 529). Applicant respectfully requests reconsideration in view of the foregoing amendments and the remarks herein below.

Rejection of Claims 1, 2 and 4-7 under 35 U.S.C. 102(a) under Qian 454

Qian 454 teaches a method for automatic extraction of semantically significant events from a video sequence. Column 2, lines 61- 66 of *Qian 454* describe the technique as detecting events by decomposing video into three levels. Importantly, the first level is "a video sequence 2 is input to the first level 4 of the technique where it is composed into shots." In contradistinction to *Qian 454*, Claim 1 teaches "obtaining unstructured video frames" Further, Column 3, lines 35-50 further describe the first level of the technique as relying on the input being a video sequence in that a video sequence is first defined as including "one or more scenes which, in turn, include one or more video shots." The fact that a sequence includes "scenes" of video contraindicates "unstructured video frames" as required in Claim 1. Further, Column 3, lines 35-50 teaches a sequence with scenes including video shots so that "the boundaries of the constituent shots of the sequence are detected 6." This teaches away from "unstructured" video frames as claimed.

Claim 1 further teaches "extracting a set by processing pairs of segments for their visual dissimilarity and temporal relationship, and merging the video

segments by applying a probabilistic analysis to the extracted set to represent the video structure".

Qian 454 fails to teach "extracting a set by processing pairs of segments for their visual dissimilarity and temporal relationship and merging the video segments by applying a probabilistic analysis to the extracted set" as required by Claim 1. *Qian 454*, and specifically, Column 3, lines 1-8 teach classifying and summarizing shots in a video sequence, but not merging of video segments; and not merging by applying probabilistic analysis. Columns 3 and 4 describe how shot boundaries can be "forced" or "inserted" into a "sequence," contrary to Claim 1 requiring "merging". Moreover, the estimation for each pair of frames in a shot in *Qian 454* is according to "global motion". Global motion is refers to the motion estimation determined in *Qian 454* by applying a Gaussian technique as is known in the art using, *inter alia,* a normalized dot product calculation between frames. In fact, most of the information used in *Qian 454* relates to motion detection and identifying content in a video sequence to segment a video sequence that contains homogeneous content. For example a hunt event is described in Column 11, lines 60-65. See also, e.g., claims 1, 5 and 8 in *Qian 454.*

In contradistinction, Claim 1 provides for "merging video segments with a merging criterion that applies a probabilistic analysis to the feature set, thereby generating a merging sequence representing the video structure" which does not relate to summarizing or identifying content in video. In fact, *Qian 454* teaches away from "merging" by teaching separating portions of a video for purposes of identifying an event. Accordingly, *Qian 454* fails to teach or suggest the limitations of Claim 1 and Claim 1 is allowable. Claims 1-9 depend from Claim 1 and are allowable for at least this reason.

Additionally, Claim 4 teaches eliminating "the presence of multiple adjacent shot boundaries" which is neither taught nor suggested in *Qian 454.* Rather, *Qian 454,* and specifically, Column 3, lines 45-50, teaches away from eliminating shot boundaries, and, instead, teaches detection of shot boundaries.

Claim 7 as amended teaches "generating parametric mixture models to represent class-conditional densities of inter-segment features of the feature set; and applying the merging criterion to the parametric mixture models." *Qian 454,* in contrast, fails to teach inter-segment features as defined by the Applicant. Rather, *Qian 454* teaches a color histogram technique used for detecting

boundaries and not inter-segment features as claimed. Rather, *Qian 454* teaches applying probabilistic techniques to features in a frame. For example, *Qian 454* states "Fig. 6 illustrates feature space outputs from multiple color and texture filters applied to a video frame." Column 10, lines 31-32.

Rejection of Claims 3 and 8 under 35 U.S.C. 103(a) under Qian 454

Claim 3 teaches that "the difference signal is based on a mean dissimilarity determined over a plurality of frames centered on one of the consecutive frames and corresponding in number of frames to a fraction of the frame rate of video capture." As stated in the office action, *Qian 454* fails to teach basing the number of frames used to calculate the difference signal on a fraction of the frame rate of video capture. A motivation cited by the office action for using a fraction of the frame rate is stated as a desire to shorten the time frame for calculating a difference signal. Contrary to the cited motivation, however, using a fraction of the frame rate of video capture would not shorten the time frame for calculating a difference signal. Rather, the use of a fraction of the frame rate could have the opposite of effect by causing a higher number of computations due to the reduced window size for calculating a difference signal. Therefore, Claim 3 is allowable over *Qian 454*.

Claim 8 teaches "initializing the queue by introducing each feature into the queue with a priority equal to the probability of merging each corresponding pair of segments; depleting the queue by merging the segments if the merging criterion is met; and updating the model of the merged segment and then updating the queue based upon the updated model." *Qian 454* fails to teach merging segments as discussed above, and further fails to teach updating a mode of a merged segment or depleting a queue by merging segments. Although official notice is relevant to queues for implementing hierarchical displays, *Qian 454* in combination with the official notice fails to teach what *Qian 454* lacks with respect to Claim 8. Accordingly, Claim 8 is believed allowable.

Rejection of Claims 9, 11-15 and 16-20 under 35 U.S.C. 103(a) under Qian 454 in combination with Qian 529

Qian 454 in combination with *Qian 529* fail to teach Claims 9, 11-15 and 16-20. *Qian 529* teaches a reality-based sports gaming network using a hierarchical event model that uses a probabilistic inferential Bayesian network that is trained using semantic events detected from a real version of a sports match. See abstract. The Bayesian network taught in *Qian 529* is a dynamic network that operates on collected data related to sports events to automatically extract semantically meaningful events from such events. The hierarchical event model taught is a Bayesian network of graphical network nodes (See Column 4, lines 62-65) and are used because Bayesian networks support the use of probabilistic inference to update and revise belief values for qualitative inferences. The Bayesian network is called Bayesian because it performs statistical inferences based on Bayes' rule meaning that decision making is according to a probabilistic distribution function to determine whether a child node should follow the value of a parent node. See Column 4, lines 32-50.

Claim 9 teaches representing the merging sequence in a hierarchical tree structure. Claims 11-15 and 16-20 teach, *inter alia*, "structuring video by probabilistic merging of video segments, said method comprising: a) obtaining a plurality of frames of unstructured video;

b) generating video segments from the unstructured video by detecting shot boundaries based on color dissimilarity between consecutive video frames;

c) extracting a feature set by processing pairs of segments for visual dissimilarity and their temporal relationship, thereby generating an inter-segment visual dissimilarity feature and an inter-segment temporal relationship feature;

d) generating a parametric mixture model of the inter-segment features comprising the feature set; and

e) merging video segments with a merging criterion that applies a probabilistic Bayesian analysis to the parametric mixture model, thereby generating a merging sequence representing the video structure.

The Bayesian analysis taught in Claims 11-15 and 16-20 applies a Bayesian analysis to a parametric mixture model of inter-segment features. Qian 454, as described above, teaches an event inference module that allows descriptors to identify shots and enable video database indexing, retrieval and browsing. Part of Qian 454 descriptors includes temporal descriptors of objects and temporal relations of video. Qian 529 could be combined with Qian 454 to provide further event identifications such as the "hunt event" mentioned in Col. 11, line 60 and further identified in Qian 529, Column 2, lines 34-36.

Although event identification for purposes of a gaming network or for extracting events from video can benefit from a Bayesian network method, neither Qian 454 or Qian 529 either alone or in combination teach applying Bayesian analysis to a parametric mixture model of inter-segment features. Importantly, Claims 11-15 and 16-20 apply the Bayesian analysis to generate a merging sequence representing the video structure and not to enable descriptors or identify child node values of a network. Similarly, although *Qian 529* teaches a hierarchical network, *Qian 529* fails to teach a hierarchical tree structure for merging sequences. The merging sequence is defined in Claim 11 as being generated using Bayesian analysis. As one of skill in the art will appreciate, using Bayesian analysis to create merging sequences and using a hierarchical tree structure as claimed is fundamentally different from creating a hierarchical network by applying Bayesian decision theory for parent-child relationships in the network nodes. Accordingly, Claims 9 and 11-20 are allowable over the *Qian 454* and *Qian 529* either alone or in combination. Claims 12-16 depend from Claim 11, and are allowable for at least this reason. Claims 17, 18 and 20 each teach applying Bayesian analysis as described including limitations included in Claim 11, "merging video segments with a merging criterion that applies a probabilistic Bayesian analysis to the parametric mixture model, thereby generating a merging sequence representing the video structure" and are allowable for the same reasons as described with regard to Claims 9 and 11. Claim 19 depends from Claim 18 and is allowable with Claim 19.

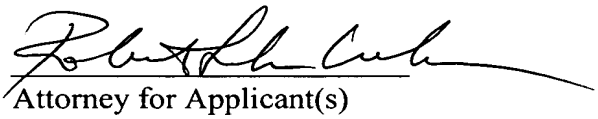
Conclusion

Claims 1-20 are pending. Claims 21 and 22 have been added. No new matter has been added thereby. The objection to Claims 10, 17 and 20 under

37 C.F.R. 1.75(c) as being of improper dependent form as been addressed by amendments to the claims. The rejection of Claims 1-2, and 4-7 under 35 U.S.C. 102 (a) has been traversed. The rejection of Claims 3 and 8 under 35 U.S. C. 103(a) has been traversed. The rejection of Claims 9, 11-15 and 16-20 under 35 U.S.C. 103(a) has been traversed.

It is respectfully submitted, therefore, that in view of the above amendments and remarks, that this application is now in condition for allowance, prompt notice of which is earnestly solicited.

Respectfully submitted,



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